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NASA TECH BRIEF

Lewis Research Center

Improved Sheath Removal Technique for Very Small Thermocouples

The problem:

To remove the stainless steel sheath from very small thermocouples without breaking the encased fine thermocouple wires. Conventional methods generally cannot be used successfully to remove the 0.02 cm (0.01 in.) diameter stainless steel or Inconel sheath (approximately 0.005 cm, or 0.002 in., thick) from the two 0.005 cm diameter alloy thermocouple wires and their magnesium insulation.

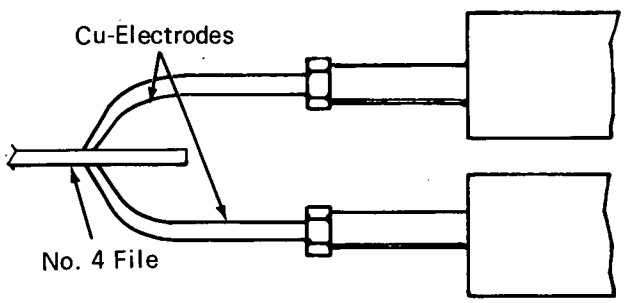

Figure 1A. Welding Head with Modified Electrodes

The solution:

A standard "weldmatic" spotwelder and a tweezer-type welding head, which burns and vaporizes the sheath material to expose a length of undamaged thermocouple wire.

How it's done:

The electrodes in the welding head are modified by drawing a flat file between them (Figure 1A) to produce a flat parallel surface on each. For best results, the electrode flats should be no larger than 0.13 cm (0.050 in.) in any direction.

The pressure-sensitive microswitch in the welding head is set to trigger at 8.5 g (3 oz). The welder is turned on, and is set to approximately 2 watt-seconds for 0.02 cm (0.01 in.) diameter sheath or approximately 5 watt-seconds for 0.05 cm (0.02 in.) diameter sheath. The thermocouple is inserted between the electrodes (Figure 1B), and the electrodes are squeezed until the microswitch fires. The current density in the sheath burns and vaporizes the sheath material, exposing a length of undamaged thermocouple wire. To remove additional sheathing, the firing can be repeated. Experiments have shown that after three or four firings the electrodes require cleaning.

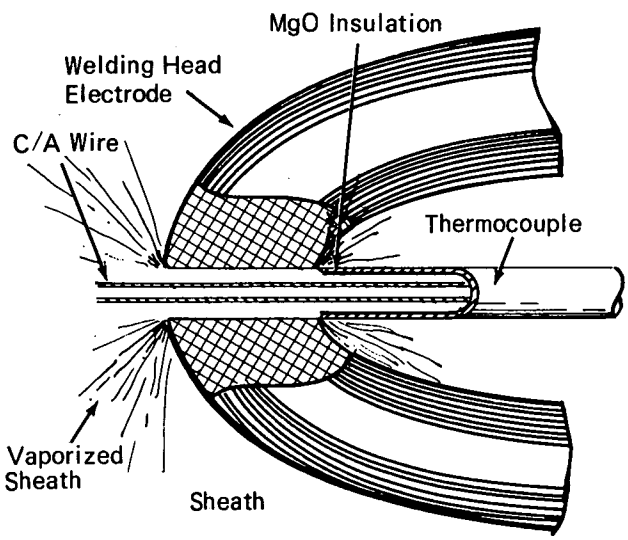

Figure 1B. Close-up View of Welding Head Electrodes Vaporizing Sheath Material from Thermocouple

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
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Reference: B71-10179

(continued overleaf)

Patent status:

No patent action is contemplated by NASA.

Source: Richard Mueller
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(LEW-11228)